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Stottmann

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[54] **APPLIANCE CONTROL ASSEMBLY**

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[51] **Int. Cl.**[6] **F21V 33/00**

[52] **U.S. Cl.** **362/85**; 362/328; 116/DIG. 28; 200/DIG. 47

[58] **Field of Search** ..... 116/279, DIG. 28; 200/314, DIG. 47; 362/85, 95, 89, 328, 253

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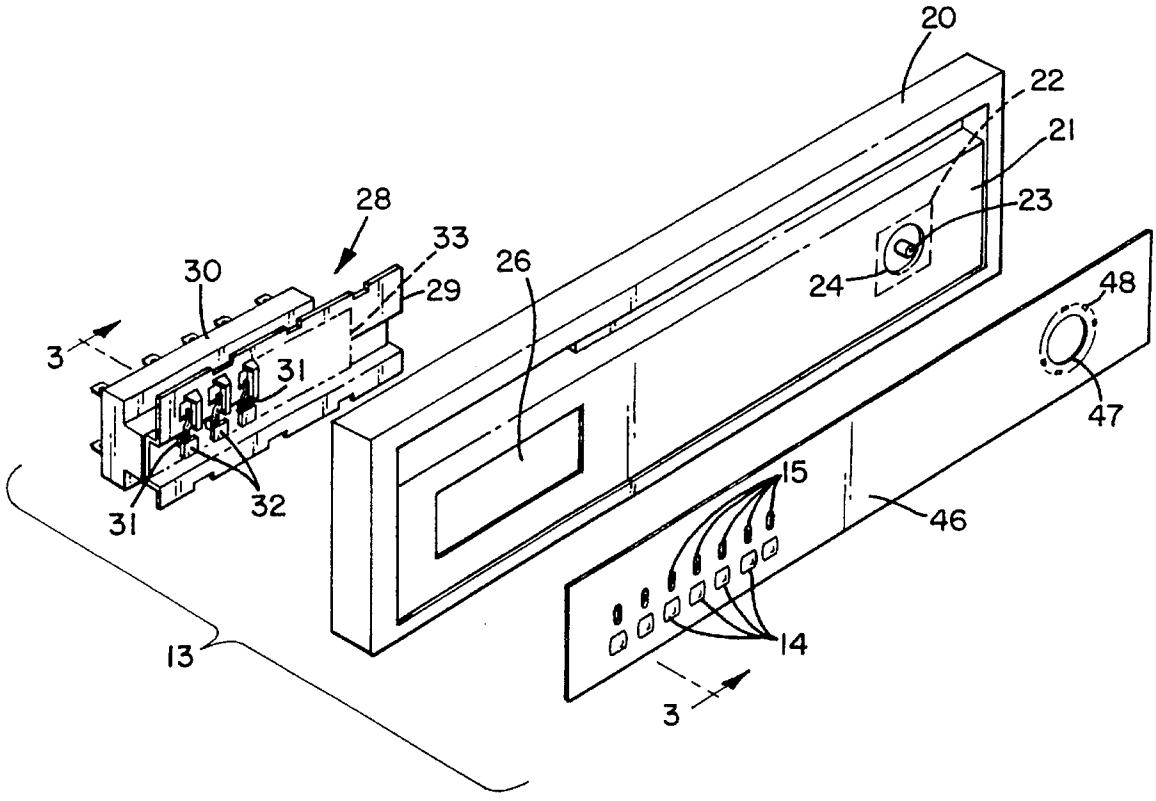
[57] **ABSTRACT**

An appliance control assembly includes an escutcheon assembly to support controls for the appliance. A push button switch mechanism includes a row of push buttons, each having an extended and a depressed position. The switch mechanism also includes a row of indicator flags integral with the push buttons for movement therewith. The escutcheon assembly includes a row of light ports positioned to be exposed to ambient light and adapted to pass ambient light through the escutcheon assembly. The switch mechanism further includes a row of prisms positioned adjacent the row of push buttons. The switch mechanism is mounted to the escutcheon assembly with the prisms aligned with the light ports to direct toward the indicator flags ambient light received through the light ports and to direct toward the light ports light reflected by the indicator flags. Each indicator flag has a reflective surface positioned to reflect ambient light received from the corresponding prism only when the corresponding push button is in its depressed position.

6 Claims, 2 Drawing Sheets



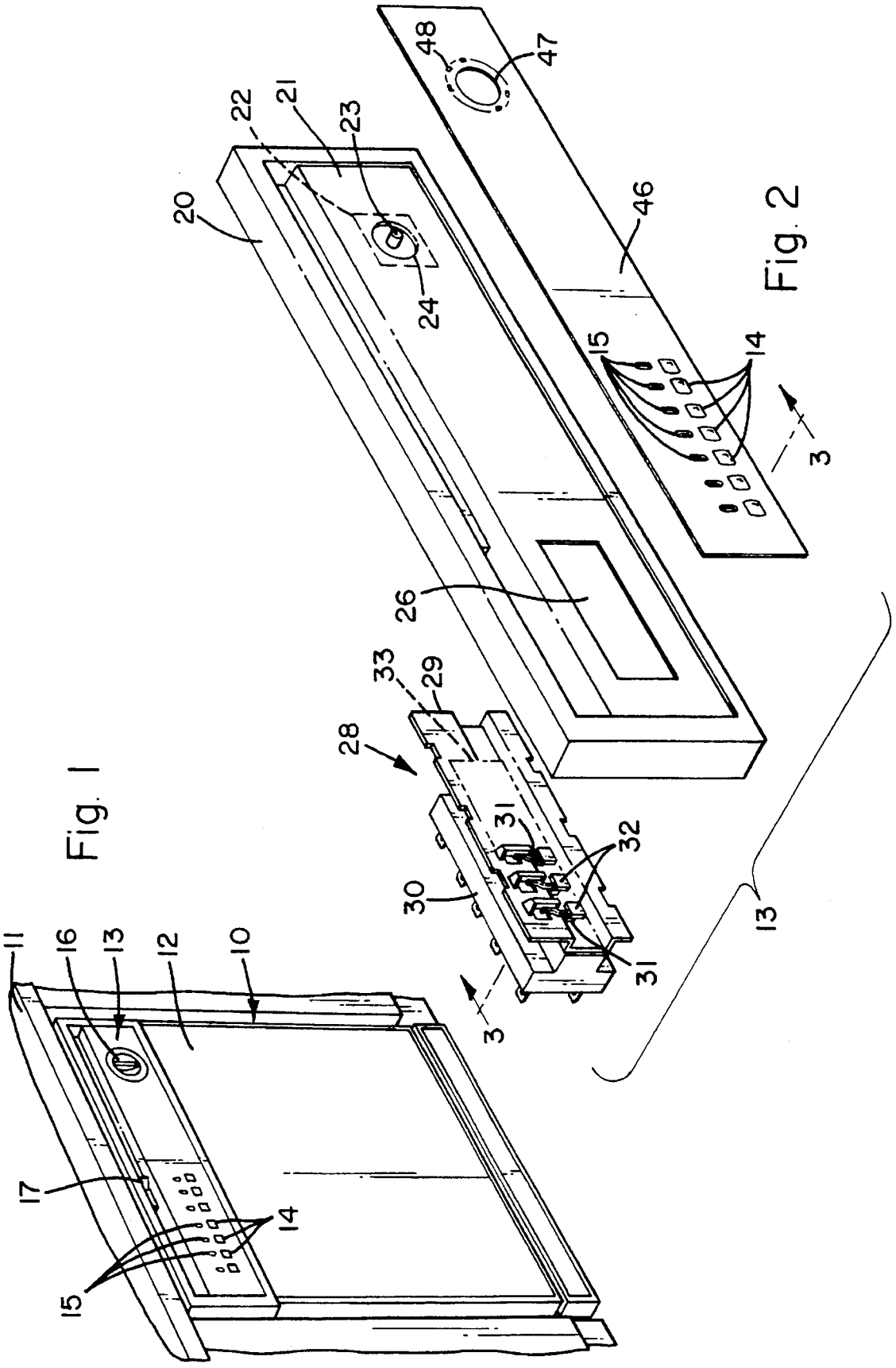

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Fig. 2

Fig. 1

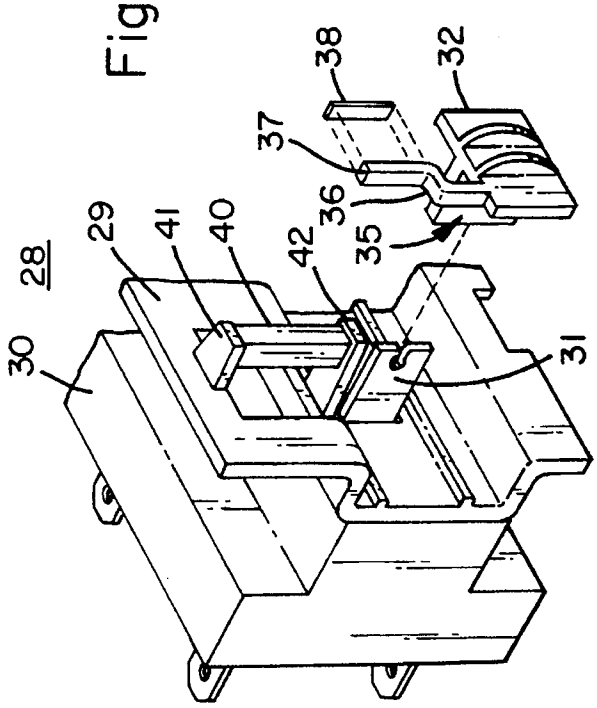

Fig. 6

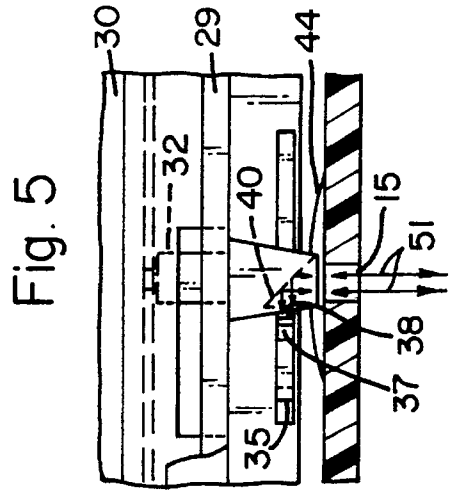

Fig. 5

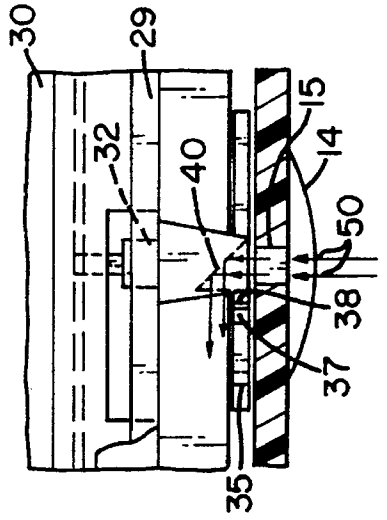

Fig. 4

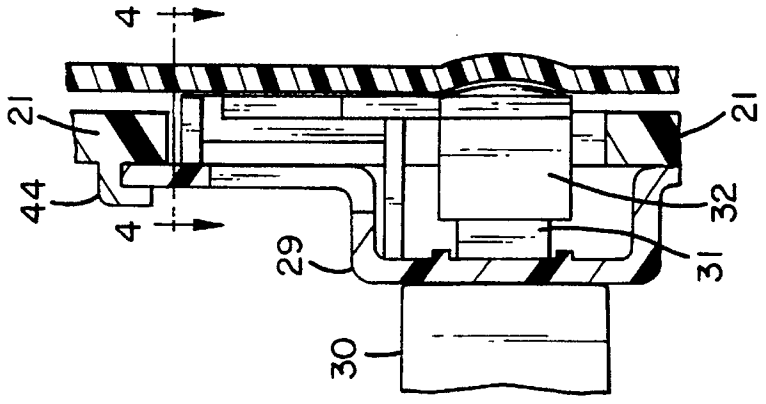

Fig. 3

APPLIANCE CONTROL ASSEMBLY

BACKGROUND OF THE INVENTION

The present invention relates to major household appliance, such as dish washers, clothes washers and clothes dryers for example. More particularly it relates to an improved control assembly for such appliances. It is very desirable to indicate to the user which cycle or mode of operation has been selected. In prior machines with push buttons or rotary controls that protrude from the front of the escutcheon assembly this was accomplished by the depressed position of the actuated push button or the angular position of the rotary control. It also can be accomplished with indicator lights at significant added cost.

Many present day major appliances use mechanical push button switch controls overlaid by a flexible cover sheet which is depressed to actuate individual push buttons. Such control assemblies provide the appearance and feel of electronic controls at a lower cost. With such control assemblies the user cannot see which push button is depressed. In addition, in order to reliably actuate the push buttons through the flexible cover sheet, push button mechanisms have been improved so the push buttons have a very short travel between their extended and depressed positions, often on the order of about 0.06 inch. This short travel makes it very difficult to actuate a mechanical system to indicate the push button position.

Switch mechanisms have been known for years which include various arrangements to provide a light adjacent a switch for indicating that the switch is in a particular position or condition. Such arrangements normally include an internal light source and a prism and reflector system for directing a portion of the light to a particular lens or opening when the switch is in a particular position. Such systems are complicated and expensive. In addition the internal light source normally has a life much shorter then the switch and must be replaced from time to time.

The users of major household appliances normally manipulate the controls and check on the status of the appliance only when there is an appreciable level of ambient light present, that is either during daylight or with the room lighting on. The present invention takes advantage of this fact to provide a simplified control assembly that uses ambient light to indicate to the user the status of the control switch mechanism.

It is an object of the present invention to provide an improved appliance control assembly that indicates to the user the status of the controls.

It is another object of the present invention to provide such an improved control assembly that utilizes reflected ambient light to illuminate a light port when an associated switch actuator is in a predetermined condition.

SUMMARY OF THE INVENTION

In accordance with one embodiment of the present invention an appliance control assembly includes an escutcheon adapted to support controls for the appliance and a slot is formed in the escutcheon. A push button switch mechanism includes a plurality of push buttons arranged in a row and each push button has an extended and a depressed position. The switch mechanism also includes a plurality of indicator flags arranged in a row with each flag being moveable with a corresponding push button. The switch mechanism further includes a plurality of prisms arranged in a row, with each prism being positioned adjacent a corresponding push button. The switch assembly is mounted on the inner side of the escutcheon with the push buttons, indicator flags and prisms received in the slot. A cover includes a plurality of touch pads arranged in a row and a plurality of light ports arranged in a row with each light port positioned adjacent a corresponding touch pad. The light ports are adapted to pass light through the cover. The cover is mounted over the outer side of the escutcheon and overlies the slot with each touch pad aligned with a corresponding push button and with each light port aligned with a corresponding prism. Each prism is adapted to direct toward the corresponding indicator flag ambient light passing through the corresponding light port and to direct outward the corresponding light port light reflected by the corresponding indicator flag. Each indicator flag includes a reflective surface positioned to reflect light received from the corresponding prism only when the corresponding push button is in its depressed position.

BRIEF DESCRIPTION OF THE DRAWINGS

While features of the invention presently considered to be novel are set forth in the appended claims; the invention, both as to organization and content, will be better understood and appreciated from the following detailed description, taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a front perspective view of a built-in dishwasher, illustrating the placement of the control assembly;

FIG. **2** is a partial exploded view of major components of the control assembly;

FIG. **3** is a cross section view of the control assembly generally as seen along line **3**—**3** in FIG. **2**, but with the assembly in its assembled configuration;

FIG. **4** is a cross section view as seen along line **4**—**4** in FIG. **3**, illustrating a push button and rod pair in its extended position;

FIG. **5** is a cross section view as seen in FIG. **4** but with the push button and rod pair in its depressed position; and

FIG. **6** is an enlarged fragmentary perspective view of the push button switch mechanism seen in FIGS. **2**–**5**.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Referring now to FIG. **1**, there is illustrated a dishwasher **10** built into a kitchen cabinet unit **11**. More particularly, the dishwasher door **12** includes an integral control assembly **13**, which includes push button actuating touch pads **14**, light ports **15** and a control knob **16**. The touch pads **14** and rotatable knob **16** are used to select the desired cycle of operation of the dishwasher and other operating parameters. As will be discussed in detail hereafter, the light ports are used to inform the user which options have been selected by depression of a touch pad. A handle **17** extends through the upper portion of the control assembly and is used to selectively lock the door **12** in its closed position so that it will not inadvertently be opened while the machine is operating.

FIG. **2** illustrates, in somewhat simplified form, certain major components of the control assembly. An escutcheon **20**, formed from a suitable molded plastic material, is an integral part of the door assembly **12** and provides support for the other components of the of the control assembly. The escutcheon **20** includes a planar base plate **21**. A control **22** is mounted on the inner side of the base plate **21** and includes a rotatable shaft **23** projecting through a circular opening **24**

in the base plate. The control knob **16** mounts on the shaft **23** and is used to set the control **22** by rotating the shaft **23**. Conveniently the control **22** may be a timer mechanism. An elongated, generally rectangular slot **26** is formed near the opposite end of the base plate **21**. As will be described in detail hereafter, push buttons, indicator flags and prisms of a push button actuated mechanical switch mechanism **28** extend through the slot **26**.

A switch mechanism **28** includes a mounting bracket **29** which supports a switch slide and contact module **30**. Actuating rods **31** extend from the front of the module **30** and project through openings in the bracket **29**. A push button **32** is mounted on the distal end of each rod **31**. Push button type switch mechanisms have been well known in the art for many years. In such mechanisms, depressing a push button **32** moves the associated rod **31** into the module to actuate one or more selected contact pairs therein. When one push button is depressed its rod moves slides in the module to releasably lock that rod and push button pair in its depressed position and normally to force at least one previously depressed button and rod pair outward to its extended position. In addition, many switch mechanisms include springs which bias the rods to their outward, extended, positions. The internal workings of the push button actuated switch mechanism do not form a part of the present invention and have been omitted for the sake of simplicity.

In the exemplification control assembly a plurality of push buttons **32** are arranged in a row along the bracket **29**. While three push buttons have been shown for illustration, it will be understood that push buttons generally are spaced apart along the entire length of module **30**, as indicated by dashed line rectangle **33**. The number of push buttons included in the switch mechanism for a particular appliance will be determined by the number of separate push button operations needed to provide for all the functions or cycles of the appliance. Referring particularly to FIG. **6**, each push button **32** includes an integral indicator flag **35** that extends upward from the button **32** and is off set inward at **36** to form a vertical face portion **37** positioned just slightly off the center of the button **32**. The face **37** is provided with a highly light reflective surface by means of a reflective overlay **38** that is attached to the face **37**. It will be understood that other approaches can be followed to provide the reflective surface. For example, the face **37** could be covered with a reflective paint or other coating or the flag could be molded from a material having high light reflective properties.

A light prism **40** is mounted above and in alignment with the center of each push button and rod pair by upper and lower tabs **41,42**. The prisms **40** are constructed and positioned to receive light traveling perpendicular to the front of the switch mechanism and redirect it to the left (as seen in FIGS. **4–6**) toward the reflective surface of face **37** and to receive light reflected from the face **37** and redirect it perpendicularly away from the switch mechanism.

The switch mechanism **28** is mounted on the inner side of escutcheon **20**, that is on the rear of base plate **21** as seen in FIGS. **2–6**, by means of brackets formed on the rear of the plate **21**, one of which is shown at **44** in FIG. **3**. The push buttons **32**, indicator flags **35** and prisms **40** and extend through the slot **26** in face plate **21**.

A cover **46** is mounted on the face plate **21** and overlies the slot **26** so as to cover the push buttons **32**, indicator flags **35** and prisms **40**. Conveniently the cover can be mechanically mounted over the front of the face plate **21** as by a channel extending around the inner edge of escutcheon **20** so as to be easily removable. If desired the cover can be more permanently mounted on the face plate **21** by a suitable adhesive. In either event the cover conveniently can be considered a part of the escutcheon or control panel assembly. The row of touch pads **14** are formed as small flexible areas in the cover **46** and each pad is aligned with a corresponding push buttons **32**. The light ports **15** are formed as small clear areas in the cover **46** and each light port **15** is aligned with a corresponding prism **40**. Conveniently the light ports **15** have the same cross section shape as the facing portions of the prisms. Suitable indicia (not shown) can be included above each light port to inform the user of the purpose of the associated push button. A circular opening **47** receives the shaft **23** and indicia **48** are provided around the opening to inform the user of significance of various rotary positions of the shaft **23** and knob **16**.

Conveniently the cover **46** can be formed as a sheet of suitable plastic material such as, for example, the polycarbonate material sold by General Electric Company under the name LEXAN. In the illustrative embodiment the cover is made opaque by silk screening an opaque coating or paint on the inner side of the sheet. In that event various indicia and other graphic elements, as desired, are silk screened on the sheet before the opaque layer of coating or paint is applied. However, other approaches, such as a separate, opaque liner for example, can be used. In any event, the light ports **15** are transparent and pass or transmit light through the cover **46**. Conveniently, in the illustrative embodiment the light ports are formed by omitting the opaque coating from small areas of the sheet. In any event, when the light ports are exposed to the ambient light present in the area in which the appliance is installed, they will pass a portion of the ambient light through the cover **46**.

FIG. **4** illustrates one of the push button **32** and rod **31** pairs in its outer or extended position and FIG. **5** illustrates the same pair in its inner or depressed position. As shown by arrows **50** in FIG. **4**, the prism **40** receives ambient light passed or transmitted through the cover **46** by light port **15** and redirects that ambient light toward face portion **37** of indicator flag **35**. However, as seen in FIG. **4**, the reflective surface **38** of face portion **37** is not aligned with prism **40** when the push button **32** is in its extended position and the light from prism **40** misses the face portion. Thus no light is reflected back through the light port, which appears to the user to be dark or not illuminated. The path of this ambient light is illustrated by arrows **50** in FIG. **4**.

In FIG. **5** the prism **40** receives light passed through cover **46** by light port **15** and redirects the ambient light toward reflective face **37**. The reflective surface **38** of face portion **37** is aligned with prism **40** when the push button **32** is in its inner or depressed position. Thus, light from prism **40** impinges the face portion **37** and is reflected back to the prism **40** which redirects it back through the light port **15** so that the light port appears bright and illuminated. This complete path of the ambient light is shown by arrows **51** in FIG. **5**.

While the invention has been illustrated in the embodiment of a dishwasher, it will be understood that the invention is applicable to other machines, particularly to other major household appliances that normally are operated in lighted areas. All the light ports will be dark or non-illuminated when the appliance is in an unlighted atmosphere. However, this does not present a problem as consumers normally do not try to set or check on the setting of such appliances in dark rooms. If there is not sufficient natural light in the room, they will turn on a light before using the appliance.

While specific embodiments of the invention have been illustrated and described herein, it is realized that modifi-

cations and changes will occur to those skilled in the art to which the invention pertains. It is therefore to be understood that the appended claims are intended to cover all such modifications and changes as fall within the true spirit and scope of the invention.

What is claimed is:

1. An appliance control assembly, including:

an escutcheon assembly adapted to support controls for said appliance;

a push button switch mechanism including a row of push buttons, each of said push buttons having an extended position and a depressed position; said push button assembly also including a row of indicator flags, each indicator flag being movable with a corresponding push button between the extended and depressed positions of that push button;

said escutcheon assembly including a row of light ports positioned to be exposed to ambient light and adapted to pass light through said escutcheon;

said push button switch assembly also including a row of prisms, each prism being positioned adjacent a corresponding push button; said push button assembly being mounted to said escutcheon assembly with each prism aligned with a corresponding light port;

each prism being adapted to direct ambient light received through the corresponding light port toward the corresponding indicator flag and to direct light reflected by the corresponding indicator flag toward the corresponding light port; and

each indicator flag including a reflective surface positioned to reflect ambient light received from the corresponding prism only when the corresponding push button is in its depressed position.

2. An appliance control assembly as set forth in claim 1, wherein: said escutcheon assembly includes an opaque area surrounding said row of light ports.

3. An appliance control assembly as set forth in claim 1, wherein: each indicator flag is integral with the corresponding push button.

4. An appliance control assembly, including:

an escutcheon adapted to support controls for said appliance and including a slot;

a push button switch mechanism including a plurality of push buttons arranged in a row, each of said push buttons having an extended position and a depressed position; said switch mechanism also including a plurality of indicator flags arranged in a row, each indicator flag being movable with a corresponding push button between the extended and depressed positions of that push button; said switch mechanism also including a plurality of prisms arranged in a row with each prism positioned adjacent to a corresponding push button;

said switch assembly being mounted on the inner side of said escutcheon with said push buttons, said indicator flags and said prisms aligned with said escutcheon slot;

a cover including a plurality of touch pads arranged in a row and a plurality of light ports arranged in a row with each light port positioned adjacent a corresponding touch pad, each of said light ports being adapted to pass light through said cover; said cover being mounted over the outer side of said escutcheon and overlying said slot with each touch pad aligned with a corresponding push button and with each light port aligned with a corresponding prism;

each prism being adapted to direct toward the corresponding indicator flag ambient light passing through the corresponding light port and to direct toward the corresponding light port light reflected by the corresponding indicator flag;

each indicator flag including a reflective surface positioned to reflect ambient light received from the corresponding prism only when the corresponding push button is in a predetermined one of its position.

5. An appliance control assembly as set forth in claim 4, wherein: each indicator flag is integral with the corresponding push button.

6. An appliance control assembly as set forth in claim 4, wherein: the portion of said cover overlying said slot is opaque and each of said light ports is a clear area therein.

* * * * *